What is claimed:

1. A method of measuring the performance of a progressing cavity pump for transferring fluid within a fluid system, the method comprising the steps of:

determining values of torque and speed inputs to the progressing cavity pump; and

using the values of torque and speed inputs to calculate one or more values representing the performance of the progressing cavity pump,

wherein the values of torque and speed inputs are determined using measured or calculated values without requiring downhole sensors.

2. The method of claim 1, wherein the values representing the performance of the progressing cavity pump are one or more values selected from the group consisting of pump flow rate, pump head pressure and pump efficiency.

3. The method of claim 1 wherein the progressing cavity pump is coupled to an electric motor and the step of determining the torque and speed inputs to the progressing cavity pump comprises the steps of:

measuring electrical voltages applied to the motor and currents drawn by the motor; and

using the measured values of electrical voltages applied to the motor and currents drawn by the motor to calculate at least one of the values selected from the group consisting of motor torque and motor speed.

4. The method of claim 3, wherein the values representing the performance of the progressing cavity pump are one or more values selected from the group

consisting of pump flow rate, pump head pressure and pump efficiency.

5. The method of claim 1, further comprising the steps of:

using at or above ground sensors to determine measured progressing cavity pump performance values for one or more of the calculated pump performance values;

comparing the measured progressing cavity pump performance values determined by the sensors with the corresponding calculated progressing cavity pump performance values; and

generating a fault sequence if the difference between corresponding values exceeds an allowable limit.

6. The method of claim 2, further comprising the steps of:

using at or above ground sensors to determine measured progressing cavity pump performance values for one or more of the calculated progressing cavity pump performance values;

comparing each measured progressing cavity pump performance value with the corresponding calculated progressing cavity pump performance value; and

generating a fault sequence if the difference between corresponding values exceeds an allowable limit.

7. The method of claim 3, further comprising the steps of:

using at or above ground sensors to determine measured progressing cavity pump performance values

for one or more of the calculated progressing cavity pump performance values;

comparing each measured progressing cavity pump performance value with the corresponding calculated progressing cavity pump performance value; and

generating a fault sequence if the difference between corresponding values exceeds an allowable limit.

8. The method of claim 4, further comprising the steps of:

using at or above ground sensors to determine measured progressing cavity pump performance values for one or more of the calculated progressing cavity pump performance values;

comparing each measured progressing cavity pump performance value with the corresponding calculated progressing cavity pump performance value; and

generating a fault sequence if the difference between corresponding values exceeds an allowable limit.

9. A method of measuring the performance of a fluid system wherein a progressing cavity pump is used for transferring fluid within said fluid system, the method comprising the steps of:

determining values of torque and speed inputs to the progressing cavity pump;

using the values of torque and speed inputs to calculate one or more values representing the performance of the progressing cavity pump; and

using the values representing the performance of the progressing cavity pump to calculate values representing the performance of the fluid system,

wherein the values of torque and speed inputs are determined using measured or calculated values without requiring downhole sensors.

10. The method of claim 9, wherein the values representing the performance of the fluid system are one or more values selected from the group consisting of pump suction pressure, pump discharge pressure, flow head loss and fluid level.

11. The method of claim 9 wherein the progressing cavity pump is coupled to an electric motor and the step of determining the torque and speed inputs to the progressing cavity pump comprises the steps of:

measuring the electrical voltages applied to the motor and currents drawn by the motor; and

using the measured values of electrical voltages applied to the motor and currents drawn by the motor to calculate at least one of the values selected from the group consisting of motor torque and motor speed.

12. The method of claim 11, wherein the values representing the performance of the fluid system are one or more values selected from the group consisting of pump suction pressure, pump discharge pressure, flow head loss and fluid level.

13. The method of claim 9, further comprising the steps of:

using at or above ground sensors to determine measured fluid system performance values for one or more of the calculated fluid system performance values;

comparing each measured fluid system performance value with the corresponding calculated fluid system performance value; and

generating a fault sequence if the difference between corresponding values exceeds an allowable limit.

14. The method of claim 10, further comprising the steps of:

using at or above ground sensors to determine measured fluid system performance values for one or more of the calculated fluid system performance values;

comparing each measured fluid system performance value with the corresponding calculated fluid system performance value; and

generating a fault sequence if the difference between corresponding values exceeds an allowable limit.

15. The method of claim 11, further comprising the steps of:

using at or above ground sensors to determine measured fluid system performance values for one or more of the calculated fluid system performance values;

comparing each measured fluid system performance value with the corresponding calculated fluid system performance value; and

generating a fault sequence if the difference between corresponding values exceeds an allowable limit.

16. The method of claim 12, further comprising the steps of:

using at or above ground sensors to determine measured fluid system performance values for one or more of the calculated fluid system performance values;

comparing each measured fluid system performance value with the corresponding calculated fluid system performance value; and

generating a fault sequence if the difference between corresponding values exceeds an allowable limit.

17. A method of controlling a progressing cavity pump for transferring fluid within a fluid system, the method comprising the steps of:

determining values of torque and speed inputs to the progressing cavity pump;

using the values of torque and speed inputs to calculate one or more values representing the performance of the progressing cavity pump;

using the progressing cavity pump performance values to produce one or more command signals; and

using the command signals to control the speed of the progressing cavity pump,

wherein the values of torque and speed inputs are determined using measured or calculated values without requiring downhole sensors.

18. The method of claim 17, wherein the step of using progressing cavity pump performance values to produce command signals comprises the steps of:

selecting a progressing cavity pump performance parameter to control;

determining a setpoint for the selected progressing cavity pump performance parameter;

calculating a control signal using the setpoint value of the selected progressing cavity pump performance parameter; and

calculating the command signals from the control signal.

19. The method of claim 18, wherein the selected progressing cavity pump performance parameter is the pump flow.

20. The method of claim 19, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively switching the speed of the progressing cavity pump between a set pump speed for a portion of a cycle period and zero speed for the remainder of the cycle period to achieve an average pump flow equal to the setpoint value of the pump flow.

21. The method of claim 18, wherein the selected progressing cavity pump performance parameter is the pump head pressure.

22. The method of claim 17 wherein the progressing cavity pump is coupled to an electric motor and the step of determining the torque and speed inputs to the progressing cavity pump comprises the steps of:

measuring the electrical voltages applied to the motor and currents drawn by the motor; and

using the measured values of electrical voltages applied to the motor and currents drawn by the motor

to calculate at least one of the values selected from the group consisting of motor torque and motor speed.

23. The method of claim 22, wherein the step of using progressing cavity pump performance values to produce command signals comprises the steps of:

selecting a progressing cavity pump performance parameter to control;

determining a setpoint for the selected progressing cavity pump performance parameter;

calculating a control signal using the setpoint value of the selected progressing cavity pump performance parameter; and

calculating the command signals from the control signal.

24. The method of claim 23, wherein the selected progressing cavity pump performance parameter is the pump flow.

25. The method of claim 24, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively switching the speed of the progressing cavity pump between a set pump speed for a portion of a cycle period and zero speed for the remainder of the cycle period to achieve an average pump flow equal to the setpoint value of the pump flow.

26. The method of claim 23, wherein the selected progressing cavity pump performance parameter is the pump head pressure.

27. A method of controlling the performance of a fluid system wherein a progressing cavity pump is used for transferring fluid within said fluid system, the method comprising the steps of:

determining values of torque and speed inputs to the progressing cavity pump;

using the values of torque and speed inputs to calculate one or more values representing the performance of the progressing cavity pump;

using the values representing the performance of the progressing cavity pump to calculate values representing the performance of the fluid system;

using the system performance values to produce one or more command signals; and

using the command signals to control the speed of the progressing cavity pump,

wherein the values of torque and speed inputs are determined using measured or calculated values without requiring downhole sensors.

28. The method of claim 27, wherein the step of using fluid system performance values to produce command signals comprises the steps of:

selecting a fluid system performance parameter to control;

determining a setpoint for the selected fluid system performance parameter;

calculating a control signal using the setpoint value of the selected fluid system performance parameter; and

calculating the command signals from the control signal.

29. The method of claim 28, wherein the selected fluid system performance parameter to control is the pump suction pressure.

30. The method of claim 29, further comprising the step of deriving the setpoint value for pump suction pressure from a fluid level command.

31. The method of claim 28, further comprising the step of determining the fluid level command, said step of determining the fluid level command comprising the steps of:

defining a fluid system performance characteristic to optimize;

varying the fluid level incrementally through a range of values;

determining a value representing the fluid system performance characteristic for each value of fluid level;

determining for which value of fluid level the value representing the fluid system performance characteristic is optimized; and

setting the fluid level command at the level which produces the optimized value.

32. The method of claim 31, wherein the step of determining the fluid level command is automatically repeated at predetermined times.

33. The method of claim 31, further comprising the step of periodically determining the pump efficiency and repeating the step of determining the fluid level command when a decrease in pump efficiency relative to prior determinations of pump efficiency is detected.

34. The method of claim 31, wherein the fluid system is a gas well, further comprising the step of periodically determining the gas production and repeating the step of determining the fluid level command when a decrease in gas production relative to prior determinations of gas production is detected.

35. The method of claim 29, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

36. The method of claim 30, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit

calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

37. The method of claim 31, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

38. The method of claim 32, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit

calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

39. The method of claim 33, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

40. The method of claim 34, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit

calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

41. The method of claim 27 wherein the progressing cavity pump is coupled to an electric motor and the step of determining the torque and speed inputs to the progressing cavity pump comprises the steps of:

measuring the electrical voltages applied to the motor and currents drawn by the motor; and

using the measured values of electrical voltages applied to the motor and currents drawn by the motor to calculate at least one of the values selected from the group consisting of motor torque and motor speed.

42. The method of claim 41, wherein the step of using fluid system performance values to produce command signals comprises the steps of:

selecting a fluid system performance parameter to control;

determining a setpoint for the selected fluid system performance parameter;

calculating a control signal using the selected fluid system performance parameter; and

calculating the command signals from the control signal.

43. The method of claim 42, wherein the selected fluid system performance parameter to control is the pump suction pressure.

44. The method of claim 43, further comprising the step of deriving the setpoint value for pump suction pressure from a fluid level command.

45. The method of claim 44, further comprising the step of determining the fluid level command, said step of determining the fluid level command comprising the steps of:

defining a fluid system performance characteristic to optimize;

varying the fluid level incrementally through a range of values;

determining a value representing the fluid system performance characteristic for each value of fluid level;

determining for which value of fluid level the value representing the fluid system performance characteristic is optimized; and

setting the fluid level command at the level which produces the optimized value.

46. The method of claim 45, wherein the step of determining the fluid level command is automatically repeated at predetermined times.

47. The method of claim 45, further comprising the step of periodically determining the pump efficiency and repeating the step of determining the fluid level command when a decrease in pump efficiency relative to prior determinations of pump efficiency is detected.

48. The method of claim 45, wherein the system is a gas well, further comprising the step of periodically determining the gas production and repeating the step of determining the fluid level command when a decrease in gas production is detected.

49. The method of claim 43, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

50. The method of claim 44, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

51. The method of claim 45, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

52. The method of claim 46, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

53. The method of claim 47, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

54. The method of claim 48, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

55. A method of controlling the performance of a fluid system wherein a progressing cavity pump is used for transferring fluid within said fluid system, the method comprising the steps of:

selecting a fluid system performance parameter to control;

determining a setpoint for the selected fluid system performance parameter;

determining values representing the performance of the progressing cavity pump;

determining values representing the performance of the fluid system;

using the pump performance values and fluid system performance values to calculate a feedforward signal by predicting a value of mechanical input to the progressing cavity pump when operating with the selected progressing cavity pump performance value at the setpoint value;

using the feedforward signal to generate command signals; and

using the command signals to control the speed of the progressing cavity pump.

56. The method of claim 55, wherein the selected fluid system performance parameter to control is the pump suction pressure.

57. The method of claim 56, further comprising the step of deriving the setpoint value for pump suction pressure from a fluid level command.

58. The method of claim 57, further comprising the step of determining the fluid level command, said step of determining the fluid level command comprising the steps of:

defining a fluid system performance characteristic to optimize;

varying the fluid level incrementally through a range of values;

determining a value representing the fluid system performance characteristic for each value of fluid level;

determining for which value of fluid level the value representing the fluid system performance characteristic is optimized; and

setting the fluid level command at the level which produces the optimized value.

59. The method of claim 58, wherein the step of determining the fluid level command is automatically repeated at predetermined times.

60. The method of claim 58, further comprising the step of periodically determining the pump efficiency and repeating the step of determining the fluid level command when a decrease in pump efficiency relative to prior determinations of pump efficiency is detected.

61. The method of claim 58, wherein the system is a gas well, further comprising the step of periodically determining the gas production and repeating the step

of determining the fluid level command when a decrease in gas production is detected.

62. The method of claim 56, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

63. The method of claim 57, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit

calculated as the pump suction pressure setpoint plus a tolerance.

64. The method of claim 58, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

65. The method of claim 59, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit

calculated as the pump suction pressure setpoint plus a tolerance.

66. The method of claim 60, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit calculated as the pump suction pressure setpoint plus a tolerance.

67. The method of claim 61, wherein the step of using the command signals to control the speed of the progressing cavity pump includes repetitively performing the method comprising the steps of:

operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit, said pump suction pressure lower limit calculated as the pump suction pressure setpoint minus a tolerance; and

operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit, said pump suction pressure upper limit

calculated as the pump suction pressure setpoint plus a tolerance.

68. A method of controlling the performance of a fluid system wherein a progressing cavity pump is used for transferring fluid within said fluid system, the method comprising the steps of:

using a check valve to prevent back flow through the pump; and

repetitively switching the speed of the progressing cavity pump between a set pump speed for a portion of a cycle period and zero speed for the remainder of the cycle period to achieve an average pump flow rate equal to a desired value of pump flow rate.

69. A pump control system for controlling a progressing cavity pump for transferring fluid within a fluid system, the pump control system comprising:

a plurality of sensors located at or above ground level;

means responsive to the sensors for determining values of torque and speed inputs to the progressing cavity pump;

means for using the values of torque and speed inputs to calculate one or more values representing the performance of the progressing cavity pump; and

means for using the progressing cavity pump performance values to produce one or more command signals for controlling the speed of the progressing cavity pump,

the values of torque and speed inputs being derived using measured or calculated values without requiring downhole sensors.

70. The pump control system of claim 69, wherein said means using the progressing cavity pump performance values to produce command signals includes means for calculating a feedback signal indicative of the difference between a current value of a selected progressing cavity pump performance parameter and a setpoint value of the selected progressing cavity pump performance parameter, and means for calculating the command signals from the feedback signal.

71. The pump control system of claim 70, wherein the selected progressing cavity pump performance parameter is the pump flow.

72. The pump control system of claim 70, wherein the selected progressing cavity pump performance parameter is the pump head pressure.

73. The pump control system of claim 69, wherein said means using the progressing cavity pump performance values to produce command signals includes means for calculating a feedforward signal by predicting a value of mechanical input to the progressing cavity pump when operating with a selected progressing cavity pump performance value at a setpoint value, and means for calculating the command signals from the feedforward signal.

74. The pump control system of claim 71, including means for repetitively switching the speed of the progressing cavity pump between a set pump speed for a portion of a cycle period and zero speed for the remainder of the cycle period to achieve an average

pump flow equal to the setpoint value of the pump flow.

75. A pump control system for controlling a progressing cavity pump for transferring fluid within a gas or oil well, the pump control system comprising:

a plurality of sensors located at or above ground level;

means responsive to the sensors for determining values of torque and speed inputs to the progressing cavity pump;

means for using the values of torque and speed inputs to calculate one or more values representing the performance of the progressing cavity pump;

means for using the values representing the performance of the progressing cavity pump to calculate values representing the performance of the well; and

means for using the system performance values to produce one or more command signals for controlling the speed of the progressing cavity pump,

the values of torque and speed inputs being derived using measured or calculated values without requiring downhole sensors.

76. The pump control system of claim 75, wherein said means for using the performance values to produce command signals includes means for calculating a feedback signal indicative of the difference between a current value of the selected performance parameter and a setpoint value of the selected performance parameter; and means for using the feedback signal to calculate the command signals.

77. The pump control system of claim 75, wherein said means using the progressing cavity pump performance values to produce command signals includes means for calculating a feedforward signal by predicting a value of mechanical input to the progressing cavity pump when operating with a selected progressing cavity pump performance value at a setpoint value, and means for calculating the command signals from the feedforward signal.

78. The pump control system of claim 76, wherein the selected performance parameter is the pump suction pressure.

79. The pump control system of claim 78, wherein said means for using the performance values to produce command signals includes means for calculating the setpoint for pump suction pressure from a fluid level command.

80. The pump control system of claim 79, wherein said means for using the system performance values to produce command signals includes means for periodically determining gas or oil production and adjusting fluid level command in response to detection of a decrease in gas or oil production.

81. The pump control system of claim 78, wherein said means for using the command signals to control the speed of the progressing cavity pump includes means for operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit that is calculated as the pump suction

pressure setpoint minus a tolerance; and means for operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit that is calculated as the pump suction pressure setpoint plus a tolerance.

82. A pump control system for controlling a progressing cavity pump for transferring fluid within a fluid system, the pump control system comprising:

means for determining values representing the performance of the progressing cavity pump;

means for determining values representing the performance of the fluid system;

means for calculating a feedforward signal by predicting a value of mechanical input to the progressing cavity pump when operating with a selected progressing cavity pump performance value at a setpoint value; and

means for calculating from the feedforward signal one or more command signals for controlling the speed of the progressing cavity pump.

83. The pump control system of claim 82, wherein the selected performance parameter is the pump suction pressure.

84. The pump control system of claim 83, wherein said means for means for calculating a feedforward signal includes means for calculating the setpoint for pump suction pressure from a fluid level command.

85. The pump control system of claim 84, wherein said means for means for calculating a feedforward signal

includes means for periodically determining gas or oil production and adjusting fluid level command in response to detection of a decrease in gas or oil production.

86. The pump control system of claim 83, wherein said means for using the command signals to control the speed of the progressing cavity pump includes means for operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit that is calculated as the pump suction pressure setpoint minus a tolerance; and means for operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit that is calculated as the pump suction pressure setpoint plus a tolerance.

87. A pump control system for controlling a progressing cavity pump for transferring fluid within a gas or oil well, the pump control system comprising:

means for determining values representing the performance of the progressing cavity pump;

means for determining values representing the performance of the well;

means for calculating a feedforward signal by predicting a value of mechanical input to the progressing cavity pump when operating with a selected progressing cavity pump performance value at a setpoint value; and

means for calculating from the feedforward signal one or more command signals for controlling the speed of the progressing cavity pump.

88. The pump control system of claim 87, wherein the selected performance parameter is the pump suction pressure.

89. The pump control system of claim 88, wherein said means for means for calculating a feedforward signal includes means for calculating the setpoint for pump suction pressure from a fluid level command.

90. The pump control system of claim 89, wherein said means for means for calculating a feedforward signal includes means for periodically determining gas or oil production and adjusting fluid level command in response to detection of a decrease in gas or oil production.

91. The pump control system of claim 88, wherein said means for using the command signals to control the speed of the progressing cavity pump includes means for operating the progressing cavity pump at a set speed until the pump suction pressure decreases to a value less than or equal to a pump suction pressure lower limit that is calculated as the pump suction pressure setpoint minus a tolerance; and means for operating the progressing cavity pump at zero speed until the pump suction pressure increases to a value greater than or equal to a pump suction pressure upper limit that is calculated as the pump suction pressure setpoint plus a tolerance.